COLORADO RIVER RECOVERY PROGRAM **Project No.: 132**
FY-2006/2007 PROPOSED SCOPE-OF-WORK for:
Population estimate of humpback chub in Westwater Canyon, Colorado River, Utah

Lead Agency: Utah Division of Wildlife Resources
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Category:
_X_ Ongoing project
___Ongoing-revised project
___Requested new project
___Unsolicited proposal

Expected Funding Source:
_X_ Annual funds
___ Capital funds
___ Other (explain)

I. Title of Proposal:

Population estimate of humpback chub in Westwater Canyon, Colorado River, Utah

II. Relationship to RIPRAP:

Colorado River Action Plan: Mainstem
V.C. Estimate humpback chub populations
V.C.2. Westwater

III. Study Background/Rationale and Hypotheses:

The Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin is currently involved in establishing recovery goals for the endangered humpback chub. Recovery goals will be based in part on maintaining

populations of humpback chub in several locations, among which is the Westwater Canyon population on the Colorado River. Establishing and measuring progress toward recovery goals necessitates monitoring to obtain accurate and precise population estimates.

A three-year population estimate was conducted for the Westwater Canyon humpback chub population estimate within ISMP during 1998-2000. Dr. Ron Ryel used Capture (M_o model) to calculate population estimates for each of the three years (1998: $3{,}299 \leq 5{,}171 \leq 8{,}287$; 1999: $1{,}349 \leq 2{,}261 \leq 3{,}942$; 2000: $1{,}095 \leq 1{,}704 \leq 2{,}758$), with respective 95% confidence intervals (Hudson et al. *draft*). Through the three years of this Westwater Canyon humpback chub population estimate, the probability of capture (*p*-hat) increased slightly and the coefficient of variation (CV) decreased (1998: *p*-hat=0.0348, CV=5.0538; 1999: *p*-hat=0.0410, CV=4.7011; 2000: *p*-hat=0.0542, CV=4.0235; Hudson et al. *draft*). The recently revised approach should further increase the probability of capture and decrease the coefficient of variation through an increase effort using multiple techniques.

The recovery goals require that subsequent population estimates for Westwater Canyon humpback chub be conducted in three out of every five years. This population estimate will meet this direction and provide for six separate point estimates within an eight-year time period. Information collected previously by the Utah Division of Wildlife Resources-Moab Field Station and recommendations from the USFWS population estimate workshops held in Winter 2002 are incorporated into the approach to provide the best opportunity of determining the most accurate and precise estimate for the Westwater Canyon humpback chub population.

IV. Goals, Objectives, End Product:

Goal: to estimate the population size of humpback chub in Westwater Canyon with the most precise confidence intervals possible.

Objectives:

1) to obtain a population estimate of adult humpback chub ($\geq$ 200 mm) in Westwater Canyon

2) to determine mean estimated recruitment of naturally produced subadult humpback chub (150-199 mm) in Westwater Canyon

End Product:

An in-depth annual progress report detailing these data (including population estimates, 95% confidence intervals, coefficients of variation, and probabilities of capture) will be completed before the winter Colorado River researchers meeting and provided to the Recovery Program and the USFWS for evaluation. At the completion of this project, the annual progress report will incorporate in-depth analyses (including population estimates,

95% confidence intervals, coefficients of variation, and probabilities of capture) for all three years of the study.

V. Study area:

Westwater Canyon, Colorado River (RM 124.5-112.5), Utah.

Sampling will occur at five locations:

I. RM 124.5-123.7 - Above and Below Miners Cabin
II. RM 123.2-121.7 - Between Miners Cabin and Cougar Bar[1]
III. RM 121.7-120.8 - Cougar Bar to Little Hole
IV. RM 120.0-119.5 - Hades Bar
V. RM 116.5-115.5 - Big Hole[2]

[1] *This location will be investigated to determine to what extent it can be sampled based on ability to access the area from a camp.*

[2] *This location will be sampled in the initial year of the project. However, sampling may be discontinued in subsequent years if the catch yields no humpback chub.*

VI. Study Methods/Approach:

Study methods will be similar to those used in the previous humpback chub population estimates in Desolation/Gray and Westwater canyons (Hudson et al. *draft*) and incorporate recommendations that resulted from the USFWS population estimate workshops held in Winter 2002.

Three sampling trips will be made in September and October approximately one to two weeks apart. Each of the five sampling locations will be sampled for one night around the crepuscular hours (i.e., late afternoon to midnight, and pre-dawn to mid-morning). Two of these sites will be sampled for an additional night to maximize captures of humpback chub in Westwater Canyon (Above and Below Miners Cabin, RM 124.5-123.7; Cougar Bar to Little Hole, RM 121.7-120.8).

Humpback chub will be captured using trammel nets, hoop nets and electrofishing at each sampling location. The number of trammel nets set at each sampling location will be maximized according to available sampling habitat (7-14 nets per sampling location). Trammel nets will be fished in 1.5 to 2 hour sets from late afternoon through approximately 2300 hrs. At that time, the nets will be pulled for the remainder of the night. Trammel nets will again be fished in 1.5 to 2 hour nets sets from pre-dawn through mid-morning. All chubs will be scanned for a PIT tag, tagged (if necessary), measured (mm; total length, depth of nuchal depression, length of origin of pectoral fin to origin of pelvic fin, length of dorsal fin base, length of anal fin base; Douglas et al. 1998, Smith et al. 1979), weighed (g), principal dorsal and anal fin rays counted, and released. Other endangered fish captured will be scanned for a PIT tag, tagged (if necessary), measured for total length (mm), weighed (g), and released. All other fish captured will be measured

for total length (mm), weighed (g), and released or disposed of accordingly. This information will be collected immediately after capture to reduce handling stress.

Hoop nets will be set at each sampling location during the evening. These nets will be fished continuously until the following morning. All chubs will be scanned for a PIT tag, tagged (if necessary), measured (mm; total length, depth of nuchal depression, length of origin of pectoral fin to origin of pelvic fin, length of dorsal fin base, length of anal fin base), weighed (g), principal dorsal and anal fin rays counted, and released. Other endangered fish captured will be scanned for a PIT tag, tagged (if necessary), measured for total length (mm), weighed (g), and released. All other fish captured will be measured for total length (mm), weighed (g), and released or disposed of accordingly.

Electrofishing will be conducted at each sampling location during the crepuscular period. In addition, electrofishing will be conducted in intervening reaches between sampling locations. All chubs will be scanned for a PIT tag, tagged (if necessary), measured (mm; total length, depth of nuchal depression, length of origin of pectoral fin to origin of pelvic fin, length of dorsal fin base, length of anal fin base), weighed (g), principal dorsal and anal fin rays counted, and released. Other endangered fish captured will be scanned for a PIT tag, tagged (if necessary), measured for total length (mm), weighed (g), and released. All other fish captured will be measured for total length (mm), weighed (g), and released or disposed of accordingly. This information will be collected immediately after capture to reduce handling stress.

All data will be forwarded to Dr. Ron Ryel for analysis using CAPTURE. This analysis will result in annual point estimates of the Westwater Canyon adult humpback chub population ($\geq$200 mm) and mean estimated recruitment of naturally produced subadult humpback chub (150-199 mm).

VII. Task Description and Schedule:

Complete 3 sampling trips (including monitoring trip) in Westwater Canyon from September-October for a humpback chub population estimate. Data from the 2007 field season will be entered on the computer and transferred to USFWS by January 15, 2008. A short annual progress report summarizing these data will be completed before the winter Colorado River researchers meeting (approximately November 10). Task schedule will be similar through the 2009 field season. At the completion of this project, the annual progress report will incorporate in-depth analyses (including population estimates, 95% confidence intervals, coefficients of variation, and probabilities of capture) for all three years of the study.

VIII. Field Season 2007 Work
Deliverables/Due Dates - See above

Field Season 2007 Budget:

Personnel
Biologists ($29.24/hr x 10hr/day x 117 total work days) $34,211

Technicians ($16.67/hr x 10hr/day x 176 total work days)	$23,340
Project Leader ($37.61/hr x 10hr/day x 11 total work days)	$ 4,137
Statistician (5 total work days)	$ 2,500
	$64,188

Travel / Per Diem

Per diem (6 people @ $15/day for 27 days)	$ 2,430
Mileage (75 mi @ $.42 per mi for 3 trips (4 trucks), shuttle of four vehicles @ $400 per trip, $5/day/ truck for 2 mos.)	$ 4,668
Gasoline (boats and generators) 3 trips	$ 2,200
	$ 9,298

Equipment

Misc. gear and camping equipment (tents, dry bags, stoves, cookware, chairs, tables, toilets, trammel nets, oars, oar blades, life jackets, dip nets, GPS units, digital camera, scales)	$ 2,500
Equipment repair and maintenance (outboards, generators, trailers, rafts, oars)	$ 2,300
	$ 4,800

Total	**$78,286**

Field Season 2008 Work

1. Deliverables/due dates: Annual progress report presented at 2008 Colorado River researchers meeting.
2. Budget: $80,635*

Field Season 2009 Work

1. Deliverables/due dates: Annual progress report presented at 2009 Colorado River researchers meeting.
2. Budget: $83,054*

Field Season 2010 Work

1. Deliverables/due dates: Draft final report to peer reviewers and Biology Committee – June 30, 2010
2. Budget: $15,000

*Includes a yearly 3% increase to adjust for increases in the cost of living.

IX. Budget Summary

FY2007	$ 44,300
FY2008	$ 79,948 (estimate)
FY2009	$ 82,014 (estimate)
FY2010	$ 50,713 (estimate)
Total	**$256,975**

X. Reviewers

Tom Chart, USBR
Dr. Richard Valdez, Valdez and Associates

XI. References

Douglas, M.E., R.R. Miller, and W.L. Minckley. 1998. Multivariate discrimination of Colorado Plateau *Gila* spp.: The "art of seeing well" revisited. Transactions of the American Fisheries Society 127:163–173.

Smith, G.R., R.R. Miller, and W.D. Sable. 1979. Species relationships among fishes of the genus *Gila* in the upper Colorado River drainage. U.S. Nat. Park Serv. Trans. Proc., Ser. 5:613-623.